# Natural Gas Supply to Vancouver Island

## *Project Summary*

Ministry of Energy, Mines
and Petroleum Resources

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**Province of British Columbia**

Ministry of Energy, Mines and Petroleum Resources

Parliament Buildings
Victoria
British Columbia
V8V 1X4

February 14, 1983

Honourable Brian R. D. Smith
Minister of Energy, Mines and
Petroleum Resources
Parliament Buildings
Victoria, British Columbia

Dear Sir:

I am pleased to submit my report on the feasibility of delivering natural gas to Vancouver Island. This report is based on engineering, market and cost data provided by the six companies proposing various components of a pipeline system to serve the Island with natural gas.

Included in the report are certain policies and procedures which you may wish to consider in the event your Government decides to proceed with formal hearings.

During the preparation of this report, I and Ministry staff met with several citizens' groups in communities along the proposed routes, and in discussing the implications of a pipeline to the Island, found a good deal of interest in the project.

In the event the project proceeds, I suggest that because of this interest, all communities in close proximity to the pipeline route be kept fully informed of development on a regular basis. I believe all the prospective applicants would co-operate wholeheartedly in developing information packages and arranging forums where complete details of their proposals would be aired, and I would further suggest the same approach be taken by those companies proposing a fertilizer project, in communities nearest their proposed plant site.

I would like to acknowledge the substantial contributions made to this study by the six prospective applicants. In addition, I wish to express my appreciation for the valuable assistance given to this study by staff of your Ministry, particularly the members of the Forecast and Special Projects Branch, under its Director, Rick Preece, and Irwin Henderson, a Senior Project Advisor.

Respectfully submitted,

Robin J. Abercrombie

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Robin J. Abercrombie

February, 1983

Victoria
British Columbia

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# *Highlights*

The Vancouver Island natural gas supply study shows:

- *Natural gas is the most cost effective future energy option for most communities on Vancouver Island.*
- *It appears at this time that the only viable option for supplying natural gas to the majority of the Island population is with a pipeline system.*
- *The capabilities of Canadian and international engineering, manufacturing, and construction industries guarantee that a safe and reliable pipeline can be built to Vancouver Island.*
- *The costs incurred to deliver natural gas to the Island by 1986 would be $457 million for a southern route, or $577 million for a northern route with capacity for a fertilizer plant.*
- *While the pipeline project would incur significant revenue deficiencies in at least the initial ten year 'build-up' period, the net economic benefits of the project are estimated to be $700 million in 1982 dollars.*
- *The Island pipeline project will contribute substantial revenues to municipal, provincial, and federal governments as a result of reduced oil import subsidies, petroleum and gas revenue taxes, rents or royalties, corporate income taxes, school and property taxes, and local franchise fees. Over a fifteen year period, total government revenues are estimated at $1.9 billion.*

- *Construction of the pipeline project would create substantial employment in British Columbia and the rest of Canada: 20,000 man years during the 1983 to 1995 period, with 10,000 of these during the first three years of construction. Once operating, the pipeline would generate an estimated 800 permanent jobs.*
- *To enable the northern route to be given serious consideration, there should be an early determination of the viability of a fertilizer plant at Powell River, a clear expression of proponent commitment, and agreement on feedstock pricing.*
- *With an early federal financial commitment, provincial approval, and initiation of a public hearing process to select proponents, natural gas could be delivered to the Island by early 1986.*
- *This study concludes that the federal government, as principal beneficiary of the project, should fulfill its commitment to provide significant financial support for a pipeline to supply natural gas to Vancouver Island. This policy commitment was made under the National Energy Program and subsequently confirmed by the federal government's financial support for the new Trans Quebec and Maritimes pipeline system.*

# 1 Introduction

The cornerstone of British Columbia's energy policy is to achieve energy security as quickly as possible. The province has a large energy resource potential in the form of coal, undeveloped hydro-electric power and natural gas, yet 45 per cent of the province's energy requirements are met by crude oil, of which three-quarters is imported from Alberta. The government of British Columbia in February, 1980 set a target of reducing oil consumption from this 45 per cent level to under 40 per cent by 1985, by:

- Substituting natural gas for oil wherever possible
- Encouraging the use of coal as an energy source in heavy industry
- Increasing the use of wood waste
- Conserving oil by using it as effectively as possible in industry, transportation, and homes.

Vancouver Island with its 500,000 residents, representing some 18 per cent of the province's population, is the last major area of British Columbia without access to the plentiful supplies of natural gas produced in the province and available on the Mainland. The aim of this report is to assess the prospects of supplying gas to this market by connecting it to the province's existing pipeline grid.

Supplying natural gas to Vancouver Island is not a new idea. It has been a topic of frequent interest over the years since gas was first delivered to the Lower Mainland in the mid-1950's. Subsequent events—including the embargo of oil shipments from the Middle East in 1973, followed by massive increases in world oil prices and the steady decline in British Columbia's and Alberta's remaining reserves of oil—provide compelling reasons for a reassessment of gas supply to the Island at this time.

Federal financial support, which was first promised in the National Energy Program of October 1980, will be critical to the timely development of a Vancouver Island natural gas pipeline and it is expected this report will be useful in commencing discussions with federal authorities on the level of funding which this project will receive. An early understanding between the federal government and the province in this area will expedite the whole regulatory process and completion of the project, allowing applicants to quickly develop marketing strategies and contractual arrangements for the purchase and resale of natural gas.

The approach used in this review was to select and examine those issues which are usually most important in the assessment of major energy projects by regulatory agencies and by the companies who will be responsible for the construction and safe operation of the facilities over the next fifty years.

The terms of reference for this assessment included not only consideration of a pipeline, but other energy delivery systems, particularly delivery of liquefied natural gas by LNG barge or tanker from the Mainland. In response to former Energy Minister R. H. McClelland's call for letters of intent from companies interested in providing natural gas service to Vancouver Island, the Ministry received 10 responses. Six favoured a pipeline, three proposed delivery by barge or tanker of liquefied natural gas,[1] while one intended to participate in financing and to undertake partial distribution.[2] In the end, no LNG proponent was able to provide, within the time available, sufficient detail on an integrated LNG delivery system, including representative costs of liquefaction, storage, transportation, and distribution. However, some interesting and useful information was received on the delivery by barge of compressed natural gas (CNG) from the Mainland. An initial review of this material indicates that CNG could be a viable alternative to petroleum products in certain coastal communities which would not be connected, at least initially, to a natural gas pipeline system.

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[1] Carter Energy Limited, B.C. Bingham Coastal Consultants, and a consortium consisting of: INTEG—Intercontinental Engineering Ltd., Capt. G. A. Veres Associates Limited, and Wright Technip Limited.

[2] Coram Financial Services.

Only the six pipeline companies provided sufficient data for inclusion in this report, but one should not rule out the possibility of an application for a project other than a natural gas pipeline for serving some of the energy requirements on Vancouver Island for those areas outside the likely geographical reach of a pipeline.

This report concludes with recommendations on the regulatory hearing process at which applications to serve Vancouver Island would be considered. It is anticipated that a public hearing will be conducted in 1983 to review those applications which are expected to be filed by the transmission and distribution companies interested in providing natural gas service to and on Vancouver Island.

The comprehensive economic analyses which provide the focus for the conclusions of this project summary are currently being prepared for publication in a technical report to be released in March. Natural gas markets and cost-benefit analysis will be principal sections in the technical report.

In this report, all volumes of natural gas are expressed in petajoules and (in parentheses) billion cubic feet. Conversion factors are:

1 petajoule (PJ) = .9117 billion cubic feet (BCF)
1 billion cubic feet (BCF) = 1.0968 petajoules (PJ).

A map at the centre of this report shows the routes and pipeline components proposed by the six companies.

# 2 *Description of Project*

The six pipeline companies which filed detailed submissions in response to the Minister's call were:

- British Columbia Hydro and Power Authority (B.C. Hydro)
- Centennial Natural Gas Pipeline Limited (Centennial)
- Inland Natural Gas Co. Ltd. (Inland)
- Pacific Northern Gas Co. Ltd. (PNG)
- Vancouver Island Gas Company Ltd. (VIG)
- Westcoast Transmission Company Limited (Westcoast).

Several of these companies filed competing applications for various system components. The data submitted by the companies varied in a number of ways and it was necessary to break down the overall project into components for purposes of comparison and analysis.

There are two basic routes to the Island, northern and southern, with the northern route beginning at Williams Lake on the Westcoast system, and tying into the Island transmission system at Courtenay. The southern route would begin on the Mainland at a terminal on B.C. Hydro's gas system in the Delta area and tie into an Island transmission system at Cedar, near Nanaimo.

The mainland portion of the northern route proposed by both Westcoast and Centennial would consist of some 390 km (240 miles) of 406.4 mm (16 inch) pipe from Williams Lake to Powell River. From Powell River to the shore in the Comox area on Vancouver Island, a distance of 32 km (20 miles), a dual 273.1 km (10.75 inch) underwater pipeline would be installed. From tidewater, a single 323.8 mm (12.75 inch) pipeline would connect with the Island transmission system at Courtenay, a distance of 11.3 km (7.0 miles) from tidewater.

The mainland portion of the southern route, advanced by B.C. Hydro, would consist of 14.7 km (9.1 miles) of 406.4 mm (16 inch) pipe from Tilbury Island in the Fraser River Delta area to Brunswick Point. From Brunswick Point, dual 406.4 mm (16 inch) pipelines would be constructed across the tidal flats to Roberts Bank and then across the Strait of Georgia to Valdes Island. The dual lines would then cross Stuart Channel to the Flewett Point area on Vancouver Island. The distance from Brunswick Point to Flewett Point is 54.8 km (34.0 miles). From Flewett Point to Cedar, a distance of 4.8 km (3.0 miles), a single 406.4 mm (16 inch) pipeline would be installed.

The Island gas transmission system would be constructed from Campbell River to Victoria with a major lateral to the Port Alberni area.

At present, propane/air is being delivered through underground distribution systems in both Nanaimo and Victoria. The Victoria propane/air system serves 4,150 customers through 235.0 km (146.0 miles) of low pressure service lines while the Nanaimo system serves 1,200 customers through 107.0 km (67.0 miles) of service lines. B.C. Hydro owns and operates the Victoria propane/air system, and Vancouver Island Gas Company (a subsidiary of Inter-City Gas Corporation), the Nanaimo system. It is anticipated that both systems would be converted to natural gas when it is available. This can be done at minimal cost.

If all the necessary regulatory approvals are granted by the summer or early fall of 1983, detailed engineering and planning work would begin later in 1983 and field construction would commence in the first quarter of 1984, providing natural gas to Island consumers by early 1986.

The components of the project proposed by the various applicants are illustrated on the following page.

# Components of Project Proposed by Applicants

| Proponent | Component | | | | | |
|---|---|---|---|---|---|---|
| | 1<br>Williams Lake to Powell River | 2<br>Powell River to Courtenay | 3<br>Tilbury Island to Roberts Bank | 4<br>Roberts Bank to Cedar | 5<br>Island Transmission | 6<br>Island Distribution |
| B.C. Hydro | | | * | * | * | * |
| Centennial | * | * | | | | |
| Inland | | | | | * | * |
| PNG | | | | | | * |
| VIG | | | | | * | * |
| Westcoast | * | * | | | * | |

# 3 Description of Proponents

## *British Columbia Hydro and Power Authority (B.C. Hydro)*

B.C. Hydro is the largest Crown Corporation in the province. Established in 1964 by the Hydro and Power Authority Act, the company produces 70 per cent of all electric power generated in the province, distributes 80 per cent of all electricity sold, and serves over one million customers. B.C. Hydro is also the largest distributor of natural gas in British Columbia, serving 329,000 customers in the Greater Vancouver and Fraser Valley areas. Total assets are $8.7 billion of which $421 million is the value of assets in the company's natural gas transmission and distribution system.

## *Centennial Natural Gas Pipeline Ltd. (Centennial)*

Centennial is a private company, provincially incorporated in 1971, with its head office in Vancouver. The company is a wholly-owned subsidiary of H. A. Simons (Overseas) Ltd. Should Centennial receive provincial approval for its proposal, it would be converted into a public company with shares being available to residents of the province. The principal business of the H. A. Simons Group, based in British Columbia, is the design and project management of pulp and paper plants in British Columbia, elsewhere in Canada, and in many other countries. The group's expertise and strength in this industry are widely respected throughout the world.

## *Inland Natural Gas Co. Ltd. (Inland)*

Inland is the principal distributor of natural gas in the Interior of the province, serving the areas of North and Central Cariboo, Okanagan, and the East and West Kootenays. The Company was incorporated in 1952 and has its head office in Vancouver. Inland currently has 107,000 customers and assets of approximately $163 million.

## *Pacific Northern Gas Ltd. (PNG)*

PNG is a controlled affiliate of Westcoast. PNG owns and operates a natural gas pipeline from Westcoast's main line near Summit Lake, north of Prince George, west to Prince Rupert, Terrace, and Kitimat. Principal communities served by this system are: Vanderhoof, Fort St. James, Fort Fraser, Fraser Lake, Endako, Burns Lake, Houston, Talkwa, Smithers, Terrace, Kitimat, and Prince Rupert.

Eighty-four per cent of PNG's sales are to industrial accounts, the largest of which is the new methanol plant at Kitimat owned by Ocelot Industries Ltd. PNG serves a total of 8,700 customers and has total assets of $102 million.

## *Vancouver Island Gas Company Ltd. (VIG)*

Vancouver Island Gas Company is 94 per cent owned by Inter-City Gas Corporation of Winnipeg (ICG). The parent company owns and operates through subsidiaries distribution systems in a number of northern communities in British Columbia, Alberta, and the Northwest Territories. As noted earlier, the Nanaimo propane/air system is owned by VIG. An ICG affiliate, Gaz Inter-Cité Québec Inc., was recently awarded the franchise for natural gas distribution in Quebec outside of the greater Montreal area. In 1982, an ICG affiliate was awarded the gas distribution franchise for New Brunswick. ICG is, as well, seeking the gas distribution franchise for Nova Scotia.

Through acquisitions ICG has become the largest distributor of propane in Western Canada (ICG Canadian Propane Ltd.). Total assets of ICG are $650 million.

## *Westcoast Transmission Company Limited (Westcoast)*

Westcoast is one of Canada's major pipeline companies. It operates 2,253 km (1,400 miles) of main transmission line and 2,575 km (1,600 miles) of gathering pipelines. Its principal source of gas is the hydrocarbon producing area in northeast British Columbia and the company's principal markets are utilities which distribute gas throughout the province. Westcoast is also a major exporter of gas to the U.S. Pacific Northwest area and is a 50 per cent partner with NOVA, An Alberta Corporation, in the Alaska Highway pipeline project, including the 'prebuild' section in Alberta, which began large scale deliveries to U.S. markets in 1981 and 1982. Through subsidiaries and associated companies, Westcoast is also involved in a significant way in exploration for and development of hydrocarbons, principally in Alberta and British Columbia. In addition to controlling Pacific Northern Gas Co. Ltd. (see page 11), Westcoast is also the lead sponsor of a world scale fertilizer (ammonia/urea) plant tentatively proposed for the Powell River area and described in Section 9 of this report. Through the acquisition of Pacific Petroleum Ltd. in 1978, PetroCanada became the largest single shareholder of the company, with ownership now at 31.3 per cent. The B.C. Resources Investment Corporation holds 8.5 per cent of the company.

Total assets of Westcoast are $1.6 billion, of which about half are in pipeline facilities.

# 4 Capital Costs and Technological Risk

Three pipeline engineering and construction specialists were selected to review the proponents' engineering and technical data and to provide an independent assessment of capital cost estimates, technological risk, and system design. Each specialist was selected because of his expertise in one of three areas of particular interest:

- Underwater pipeline crossings—J. W. Taylor, P. Eng.
- Pipelines in mountainous areas— L. M. Brocklebank, P. Eng.
- Distribution system design and operation—R. C. Wharton, P. Eng.

This assignment was conducted under a contract with Loram International Ltd. of Calgary, with L. M. Brocklebank, vice president of Loram, serving as Project Manager.

## Capital Cost Estimates

In order to establish a common base to which the capital cost estimates of each company could be related, the project was broken down into the following components:

- Northern Route
  Mainland—Williams Lake to Powell River.
  Marine crossing—Powell River to Comox.
  Vancouver Island Transmission—Campbell River to Victoria.

- Southern Route
  Mainland—Tilbury Island to Brunswick Point.
  Marine crossing—Brunswick Point to Flewett Point.
  Vancouver Island Transmission—Campbell River to Victoria.

- Island Distribution Systems

The capital cost estimates for each of these components are shown in the next table. These costs are estimated by the engineering consultants to be accurate, plus or minus 10 per cent.[1] This demonstrates a higher degree of accuracy than is normally expected at the application phase. It was found, however, that three of the six proponents had conducted quite complete engineering and planning studies, while the other three, although providing adequate data for the hearing phase, were less complete in terms of engineering depth and detail. However, it is important to note that at least one company was thorough in each of the project components listed above.

The writer accepts the cost estimates provided by the technical consultants. These costs are used in the economic and financial sections of this report.

# *Engineering, Construction, and Risk*

Construction of a pipeline under the Strait of Georgia has not been attempted before and some concern has been expressed about the technical risk inherent in such an undertaking. Similar concern was expressed about the integrity of a pipeline which would be built through a high mountain pass in the Coastal Range en route to Powell River. The engineering consultants were asked to comment on these issues in particular and on issues related to costs. Excerpts follow from their reports on Mainland transmission (northern route), submarine crossings and local distribution.

The companies that participated in this assessment are not named in the excerpts. This is necessary because each proponent contemplates a public hearing where design and construction criteria would be filed as evidence and be subject to rigorous cross-examination. To compare and comment on the quality of individual company data filed for this assessment would not be compatible with the prospect of an early regulatory hearing, where each applicant's technical data would receive an independent review.

[1] Included in submitted capital cost estimates were provisions for 'contingencies'. In the financial analysis, capital costs were also assumed to escalate more rapidly than the rate of inflation.

# Estimates of Mainline Transmission and Distribution Capital Costs

(millions of current dollars)

| Component | 1983 | 1984 | 1985 | Total 1983–1985 |
|---|---|---|---|---|
| **Northern Route** | | | | |
| Mainland Transmission | 9 | 141 | 118 | 268 |
| Marine Crossing | 1 | 5 | 29 | 34 |
| Island Transmission | 1 | 56 | 68 | 126 |
| Island Distribution | 13 | 43 | 46 | 102 |
| Interest During Construction | 1 | 13 | 33 | 48 |
| Total | 25 | 258 | 294 | 577 |
| **Southern Route** | | | | |
| Mainland Transmission | 4 | 27 | 3 | 34 |
| Marine Crossing | 25 | 125 | 12 | 162 |
| Island Transmission | 12 | 62 | 30 | 104 |
| Island Distribution | 13 | 43 | 46 | 102 |
| Interest During Construction | 3 | 17 | 35 | 55 |
| Total | 57 | 274 | 126 | 457 |

Notes: Ninety per cent of capital expenditures on transmission occur prior to 1986. Most of the expenditures following startup are for extensions to local distribution systems.

Columns or rows may not add to totals because of rounding.

## *Mainland Transmission (Northern Route)*

*"We reviewed the cost estimates from basic principles and assured ourselves that they have done detailed quantity take-offs and pricing. We reviewed the difficult Mainland construction areas on the route and it is our view they do not encounter anything more extreme than some of the areas on existing pipeline systems in the province."*

## *Submarine Crossings*

*"All designs presented in the three proposals for the marine crossing are within today's state of the art and would provide safe and reliable crossing."*

*"Preliminary investigations are complete to an extremely high degree over both the north and south corridors, and specific pipeline routes have been selected."*

*"During the route selection process, possible problem areas have been identified and corrections or modifications have been made to the location of the design."*

*"Cost estimates are complete and should be considered accurate within rather close limits. Estimated direct costs for material, installation and engineering and project management agree between the three studies and are consistent with today's expected costs."*

*"All proposals have carried the engineering and the cost estimates well beyond the normal level of the preliminary stage. The remaining technical studies and engineering have been identified and are scheduled and costed in each proposal."*

*"All the materials, tools and equipment are presently on the world market which are necessary to fabricate, install, test, commission, and safely and reliably operate any of the proposed crossings. Similar crossings have been installed and are being operated using the proposed design and installation methods in the Gulf of Mexico, North Sea and Mediterranean Sea. All designs consider and provide for possible hazards including laying stress, hydrodynamic forces, bottom instability and interference by anchors or fishing gear."*

*"The company has done more engineering than would be expected for a permit application. They have made extensive investigations of the bottom conditions in the Strait of Georgia and have found a route which passes through a pass in the rock ridge near the Vancouver Island side. The underwater terrain has been confirmed both by electronic surveys and by visual inspection from a submarine."*

*"To develop all of their costs and designs they have supplemented their own staff with some highly respected consultants. In reviewing this company's work we started each operation from the basic principle used and followed the development through the engineering process to confirm the numbers supplied."*

*"The other engineering problem reviewed with this company was the effects of the high voltage direct current cable crossing on the pipe coating. They informed us that in normal operating mode the cable was operating with a closed return, which would have no effect on the pipeline. In an upset condition they would still use the sea return for short periods. To determine if this condition would adversely affect the coating they developed a system model and took potential readings."*

*"The results of the test indicated that the potentials on the pipe would not be harmful. Currently, this company is also looking at doing some modifications in their electrical substations that would eliminate the need for a sea return entirely."*

## Local Distribution

*"It appears that all of the distribution systems have been designed by doing representative models of each community. The concept is consistent with what would be expected in good engineering practice. We were able to do a detailed review of both companies' proposed systems with excellent correlation between the costs. Another company did not have the detailed backup to their report available but their methodology was the same."*

# 5 *Markets*

As part of the assessment of the delivery of natural gas to and on Vancouver Island, an examination of likely future markets for natural gas on the Island was carried out. In developing the forecasts, it was assumed that the following communities on the Island would be served by natural gas:

Campbell River
Courtenay/Comox
Cumberland
Port Alberni
Qualicum Beach
Parksville
Nanaimo
North Cowichan
Ladysmith
Duncan
Central Saanich
Esquimalt
North Saanich
Oak Bay
Saanich
Sidney
Victoria

The general approach used to develop the forecasts was to carry out a detailed examination of energy demand by market sector and subsector. The assumptions on economic growth, population growth, and energy prices on which the forecast is based are discussed beginning on the next page, followed by a description of the results.

# *Assumptions*

Economic activity (in whole and for major segments of the economy) and population growth (and related activity such as household formation) will affect the future demand for natural gas on Vancouver Island. In developing assumptions in these areas, the study relied heavily on recent, long term provincial forecasts of economic activity and population growth. In summary, following modest economic growth in the short term, the Island economy is expected to experience healthy growth over the remainder of the century, with an average annual growth in real Gross Domestic Product of some 4.5 per cent over the period. Population growth is also expected to be robust with the Island population experiencing average annual growth of about 2 per cent.

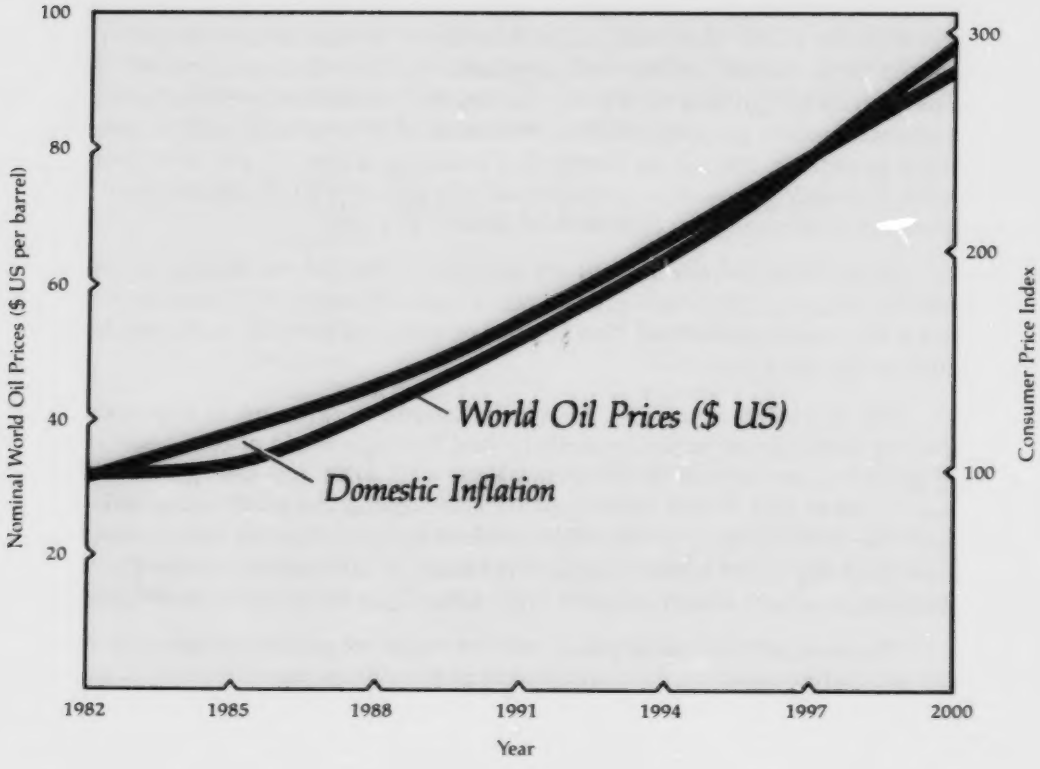
In addition to economic activity and population growth, energy prices will affect the demand for natural gas and other forms of energy. The most important price is the world price of oil. The forecast of world oil prices is presented in the figure on the next page.

Oil importing countries, of which Canada is one, are in a process of adjusting domestic oil prices upwards toward the high world price. Canadian oil and gas prices are at present well below this world price, but this gap should be closed considerably within a few years. In future, Canadian oil prices will continue to be influenced by world prices. A forecast, therefore, of future world oil prices is an important component in this study for determining future prices of petroleum products which compete with natural gas for markets on the Island.

The forecast of world oil prices exhibits moderate growth compared to what most forecasting agencies were suggesting as recently as one or two years ago. It is, however, generally consistent with more recent views. Forecasts of refined petroleum product prices on Vancouver Island reflect the world oil price assumption presented in this figure. For electricity, it was assumed that electricity prices on Vancouver Island would grow at the average of 2 per cent above the rate of inflation during the 1980's, moderating to 1 per cent thereafter.

The effects of two approaches for establishing natural gas prices to consumers on the Island were examined: an 'Eastern Canadian Price' and a 'Market Clearing Price'.

# Projection of World Oil Prices and Domestic Inflation



The Eastern Canadian Price is the one which now applies in eastern Canada, Toronto, Montreal, Quebec City and Halifax and it is approximately 65 per cent of the blended oil price adjusted to an equivalent heating value basis, delivered to the city gate. This is the pricing policy which is being used to facilitate the major gas pipeline extension now under construction in Quebec and one proposed for the Maritime provinces by Trans Quebec and Maritime Pipeline Inc.

The Market Clearing Price is set sufficiently below the price of other energy forms (primarily oil products) to allow gas to capture a reasonable share of the market. The discounts vary by market sector but generally are set about 10 per cent below the price of competitive energy forms.

The Eastern Canadian Price is considerably lower than the Market Clearing Price. This results in a somewhat larger market share for natural gas. These prices are discussed further in the section, Financial Results.

# *Results*

In the residential sector it is anticipated that natural gas demand will increase rapidly with the introduction of gas service for the 1985/86 heating season, to 9.3 PJ (8.5 BCF) by 1990. Between 1990 and 2000, as the gas market matures, residential gas demand is forecast to grow at an average rate of 3.0 per cent, with 12.5 PJ (11.4 BCF) of demand in 2000. For existing houses, most of the gains for natural gas will be at the expense of light fuel oil, and to a lesser extent, liquefied petroleum gases. Natural gas is also expected to capture most of the new housing market at the expense of light fuel oil and electricity.

The commercial sector covers a range of activities from government to retail trade to light industry. Total natural gas requirements in this sector are forecast to grow from 5.4 PJ (4.9 BCF) in 1990, to 8.6 PJ (7.8 BCF) in 2000, representing a healthy average growth of 4.8 per cent over the period. The strongest growth is expected in the service sectors such as tourism.

The heavy industrial sector on Vancouver Island basically consists of four pulp and paper mills. Two estimates of natural gas use by this sector were developed. In the first, industrial gas demand is maintained at 12 to 14 PJ (11 to 13 BCF) a year until the early 1990's when it drops to 8 PJ (7.3 BCF). This drop reflects an expectation that without a specific policy to prevent it, increased supplies of heavy fuel oil will back out some potential natural gas demand. In the second, it is assumed that a policy would be implemented whereby heavy fuel oil would not supplant gas use on the Island, with the result that the industrial demand for gas remains at some 13 PJ (11.8 BCF) annually. In both cases, it is assumed that natural gas will not supplant hog fuel. The lower of the two forecasts is the one used in all of the financial and economic analysis of this report.

With the introduction of gas service on the Island, modest quantities of compressed natural gas may be used in the transportation sector, displacing gasoline.

In summary, it is forecast that with the introduction of gas service to the Island in 1985/86, natural gas demand will grow from about 18 PJ (16.4 BCF) in 1986 to between 20 PJ (18.2 BCF) and 25 PJ (22.8 BCF) annually after 1990. This forecast is within the range of the forecasts prepared by the various proponents.

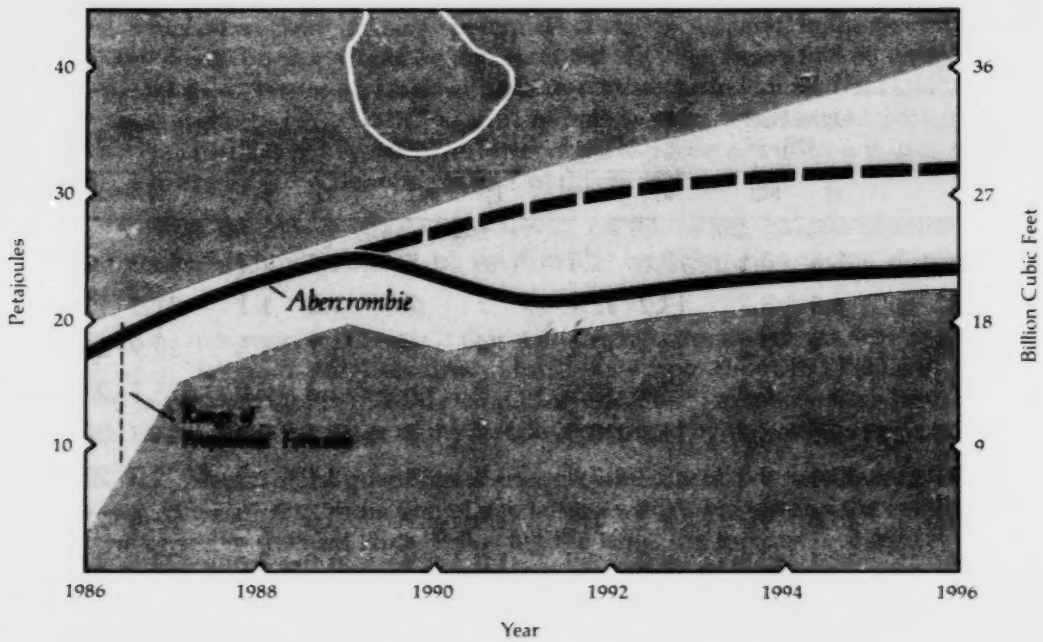
A forecast of the quantities of energy (primarily oil products) which will be displaced with the introduction of gas service was also made and the results are summarized in the next table. Following the table, the forecast is illustrated in a figure which also shows the range of forecasts provided by the proponents. The solid lower curve in the figure reflects the first estimate of heavy industrial gas sales described above, and the broken upper curve reflects the second estimate of industrial sales.

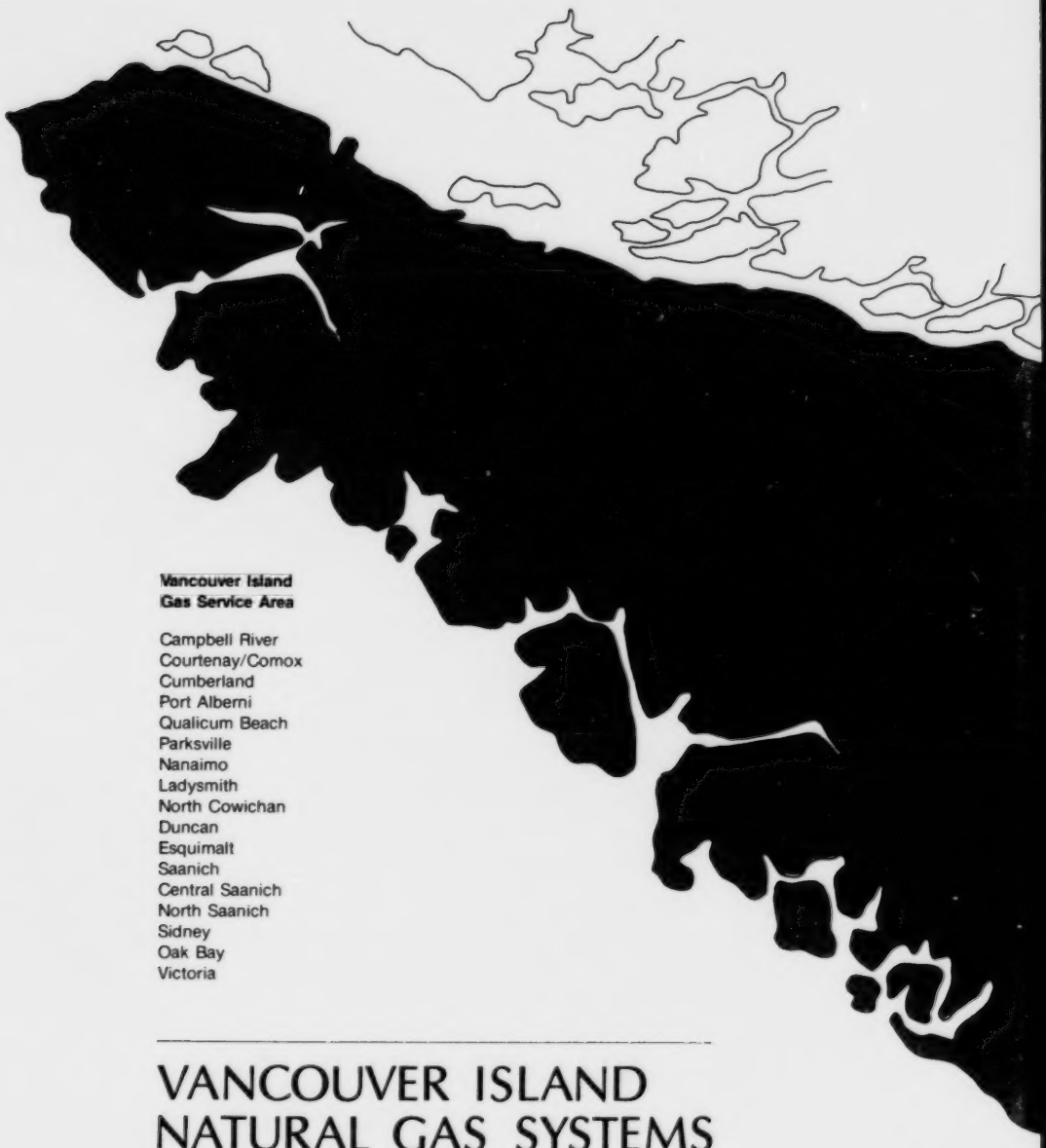
# Forecast of Energy Displaced by Natural Gas on Vancouver Island

| | Light Fuel Oil | | Heavy Fuel Oil* | | LPG | | Electricity | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PJ | BCF | PJ | BCF | PJ | BCF | PJ | BCF | PJ | BCF |
| 1986 | 3.4 | 3.1 | 13.6 | 12.4 | .6 | .5 | .4 | .4 | 18.0 | 16.4 |
| 1987 | 6.3 | 5.7 | 13.2 | 12.1 | .7 | .7 | 1.2 | 1.1 | 21.4 | 19.6 |
| 1988 | 7.9 | 7.2 | 13.4 | 12.2 | .9 | .8 | 1.7 | 1.6 | 23.9 | 21.8 |
| 1989 | 9.2 | 8.4 | 13.4 | 12.2 | .9 | .8 | 2.2 | 2.0 | 25.7 | 23.4 |
| 1990 | 9.6 | 8.7 | 11.5 | 10.5 | .9 | .8 | 2.7 | 2.5 | 24.7 | 22.5 |
| 1991 | 10.1 | 9.2 | 8.2 | 7.4 | .9 | .9 | 3.1 | 2.9 | 22.3 | 20.4 |
| 1992 | 10.6 | 9.7 | 8.2 | 7.4 | 1.0 | .9 | 3.6 | 3.2 | 23.4 | 21.2 |
| 1993 | 11.1 | 10.1 | 8.3 | 7.5 | 1.0 | .9 | 4.0 | 3.6 | 24.4 | 22.1 |
| 1994 | 11.6 | 10.6 | 8.3 | 7.6 | 1.0 | .9 | 4.0 | 4.0 | 24.9 | 23.1 |
| 1995 | 12.2 | 11.1 | 7.8 | 7.1 | 1.0 | .9 | 4.8 | 4.4 | 25.8 | 23.5 |
| 2000 | 14.5 | 13.2 | 7.6 | 7.0 | 1.1 | 1.0 | 6.4 | 5.8 | 29.6 | 27.0 |

Note: * Based on the low forecast of heavy industrial natural gas use.

# Forecast of Gas Sales on Vancouver Island





**Vancouver Island Gas Service Area**

Campbell River
Courtenay/Comox
Cumberland
Port Alberni
Qualicum Beach
Parksville
Nanaimo
Ladysmith
North Cowichan
Duncan
Esquimalt
Saanich
Central Saanich
North Saanich
Sidney
Oak Bay
Victoria

# VANCOUVER ISLAND NATURAL GAS SYSTEMS

BC

**Proponents**

B.C. Hydro and Power Authority
Centennial Natural Gas Pipeline Limited
Inland Natural Gas Co. Ltd.
Pacific Northern Gas Co. Ltd.
Vancouver Island Gas Company Ltd.
Westcoast Transmission Company Limited

Project Components
to Williams Lake
NORTHERN MAINLAND 1
390 Km (242 Mi.)
Powell River
43 Km (27 Mi.)
2 NORTHERN MARINE
Comox
Squamish
Port Mellon
Qualicum Beach
Vancouver
Tilbury Island
74 Km (46 Mi.)
3 SOUTHERN MAINLAND
4 SOUTHERN MARINE
December 11, 1982

# 6 Financial Results

The objective of this section is to describe all of the costs and revenues of the project as a stand alone entity. On the cost side, the actual facilities must be paid for over time. There are costs to operate and maintain the system, taxes must be paid to municipal, provincial, and federal authorities, and gas must be purchased for resale to consumers. The cost of the facilities, operating and maintenance expenses, and taxes are usually grouped together and called 'cost of service'. The cost of service plus the wholesale cost of gas constitute the total revenue requirement of the utility. Cost of service is first discussed below, followed by a discussion on the wholesale price of gas, revenues and the revenue deficiency or surplus.

## Cost of Service

The capital costs of the pipeline facilities are recovered by including a charge for 'depreciation' in the rates paid by consumers. Therefore, depreciation is used to pay off the debt incurred by the utility which builds and operates the project. In addition, consumers are charged for interest on the remaining debt and for the return on equity earned by shareholders if the utility is a private corporation.

Another component of the cost of service is operating and maintenance costs. These are the current costs of operating and maintaining the system, including salaries and wages, equipment such as trucks, maintenance of right-of-way, insurance, repairs, etc.

A pipeline operation also pays large amounts in taxes and fees to municipal, provincial, and federal governments. At the municipal level there are property taxes and school taxes (collected on behalf of the province), franchise fees, and a local business tax. If the utility is a Crown corporation it pays grants to municipalities in lieu of these taxes. At the provincial level, there is the corporate income tax, a capital tax and a tax on the fuel used in compressors. If it is a Crown corporation, no corporate income taxes would be paid to the province. These revenues foregone by the province would be reflected in lower rates to consumers. At the federal level there is the corporate income tax on privately-owned utilities. In addition, there are a number of federal taxes embodied in the wholesale price of gas paid by the utility for distribution to consumers.

The table below shows the components of the cost of service for the northern route.

## Components of Cost of Service on Northern Route

(millions of current dollars and per cent)

| Component | 1986 | | 1995 | |
|---|---|---|---|---|
| | $ millions | per cent | $ millions | per cent |
| Depreciation | 20.5 | 15 | 30.0 | 17 |
| Income, Property, and Franchise Taxes | 42.6 | 32 | 67.0 | 37 |
| Return to Equity | 25.6 | 19 | 25.0 | 14 |
| Cost of Debt | 32.4 | 25 | 32.1 | 18 |
| Compressor Fuel | 3.3 | 3 | 7.4 | 4 |
| Other Operating Expenses | 7.7 | 6 | 17.9 | 10 |
| Total | 132.1 | 100 | 179.4 | 100 |

## *Wholesale Price of Gas*

For the purpose of estimating the total revenue requirement of the project on a stand alone basis, it was assumed the average wholesale price of gas in British Columbia would be phased in to equal 65 per cent of the refinery gate price of crude oil at Vancouver by 1990, and that it would be maintained at 65 per cent of the crude price thereafter. The wholesale prices at Williams Lake (northern route) and Huntingdon (southern route) reflect this basic assumption. Tariffs used by pipeline companies for transporting natural gas in British Columbia, among other factors, take into account the distance which gas is moved from its source to final destination. The greater the distance, the higher the cost or tariff. Thus the wholesale prices at Williams Lake (northern route) and Huntingdon (southern route) reflect the transportation mileage differential.

Retail prices in the Eastern Canadian Price case are based on the wholesale price, as described above, but with the gas assumed to be delivered at the respective city gates, plus a local distribution margin, that is to say, assuming no costs for transmitting the gas from the above delivery points to the city gates. In the Market Clearing Price case, retail prices are unrelated to the wholesale price or the cost of service.

## *Revenues*

Revenues in each price case are the prices times the corresponding volumes.

## *Revenue Deficiencies and Surpluses*

The revenue deficiency is the excess of the total revenue requirement over total revenues received. A surplus exists when revenues received exceed revenues required. The revenue deficiency (or surplus) differs depending on whether Eastern Canadian or Market Clearing Prices are used.

With the Market Clearing Price for natural gas, the price at the 'burner tip' was assumed to be set as high as it could be to realize the forecast. That is, natural gas prices, on an equivalent heating value basis, were set modestly below prices of alternative fuels, such as stove and furnace oil, with gas prices discounted only to the extent required to induce a buyer to opt for natural gas. Under the National Energy Program, the price of Canadian crude oil paid by refiners is set at less than the level of the international crude price.

In addition to the shelter which Canadian consumers of oil products receive from the impact of international oil prices, the National Energy Program introduced a major incentive for the displacement of oil by natural gas. In eastern Canada the wholesale price of gas at the city gates (before local distribution) is maintained as a federal government policy at 65 per cent of the domestic price of oil. This is the Eastern Canadian Price. This substantial discounting of gas prices provides a major incentive in favour of natural gas and for the rapid conversion from the use of oil products.

In the section on project funding, the issue of reducing or eliminating revenue deficiencies in the early years is addressed. Under a more conventional environment, a pattern of revenue deficiencies in the initial years, the 'build up' period, and surpluses thereafter, are typical of every major pipeline extension. However, in the Eastern Canadian Price case, revenue deficiencies are present throughout the forecast period to the year 2000. In the Market Clearing Price case, deficiencies occur each year from 1986 (first full year of operation) through to 1996. Starting in 1997 a surplus occurs and each year thereafter becomes progressively larger.

The estimated revenue deficiencies and surpluses for the southern route based on the Eastern Canadian Price and on the Market Clearing Price are shown in the table and the first figure which follow. The second figure shows the deficiencies and surpluses under Market Clearing Prices for the southern route and the northern route with and without a fertilizer plant.

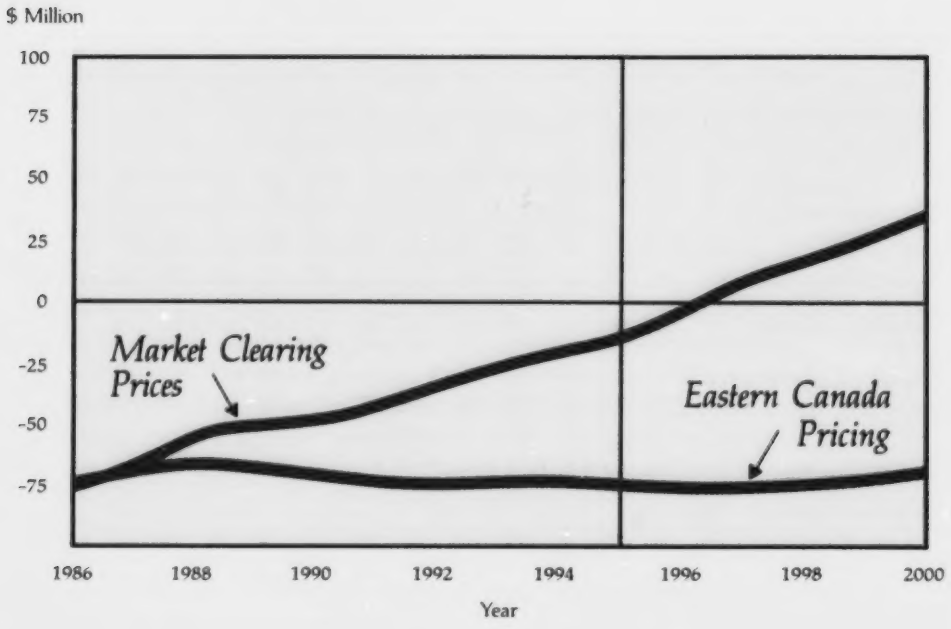
# Revenue Required, Revenue Received and Revenue Deficiency, Southern Route, Both Price Cases

(millions of current dollars)

| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Southern Route—Eastern Canadian Price** | | | | | | | | | | | | | | | |
| Revenue Required: | | | | | | | | | | | | | | | |
| Cost of Service | 106 | 114 | 110 | 121 | 130 | 128 | 131 | 135 | 140 | 149 | 147 | 141 | 142 | 140 | 138 |
| Purchase of Gas for Resale | 77 | 101 | 120 | 143 | 154 | 153 | 171 | 189 | 207 | 222 | 235 | 249 | 264 | 282 | 300 |
| Total | 183 | 215 | 230 | 264 | 284 | 281 | 302 | 324 | 347 | 371 | 382 | 390 | 406 | 422 | 438 |
| Revenue Received | 107 | 140 | 160 | 189 | 205 | 205 | 226 | 249 | 271 | 293 | 305 | 316 | 331 | 347 | 364 |
| Revenue Surplus (Deficiency) | (76) | (75) | (70) | (75) | (79) | (76) | (76) | (75) | (76) | (78) | (77) | (74) | (75) | (75) | (74) |
| **Southern Route—Market Clearing Price** | | | | | | | | | | | | | | | |
| Revenue Required: | | | | | | | | | | | | | | | |
| Cost of Service | 106 | 114 | 110 | 121 | 130 | 128 | 131 | 135 | 140 | 149 | 147 | 141 | 142 | 140 | 138 |
| Purchase of Gas for Resale | 77 | 101 | 120 | 143 | 154 | 153 | 171 | 189 | 207 | 222 | 235 | 249 | 264 | 282 | 300 |
| Total | 183 | 215 | 230 | 264 | 284 | 281 | 302 | 324 | 347 | 371 | 382 | 390 | 406 | 422 | 438 |
| Revenue Received | 106 | 146 | 176 | 211 | 231 | 237 | 266 | 295 | 326 | 353 | 375 | 398 | 422 | 447 | 472 |
| Revenue Surplus (Deficiency) | (77) | (69) | (54) | (53) | (53) | (44) | (36) | (29) | (21) | (18) | ( 7 ) | 8 | 16 | 25 | 34 |

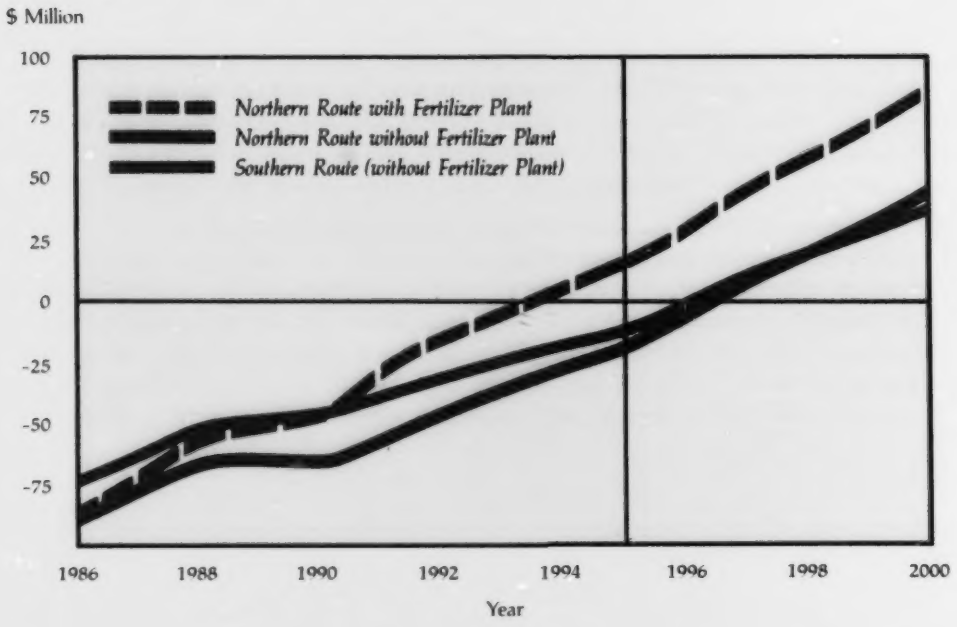
# Comparison of Annual Revenue Deficiencies, Southern Route (Both Price Cases)

(millions of current dollars)



# Comparison of Annual Revenue Deficiencies for Alternate Routes (Market Clearing Price)

(millions of current dollars)



# 7 Economic Impacts

In the preceding section it was shown that the project, when viewed from the perspective of a private company, demonstrates revenue deficiencies, at least in its early years. It is also important, however, to determine whether the project makes sense from the larger perspective of society as a whole. Three methods of economic analysis were used to measure whether delivering natural gas to and on Vancouver Island makes sense: cost-benefit analysis, cost-effectiveness analysis, and employment generation analysis. The results are summarized in the following.

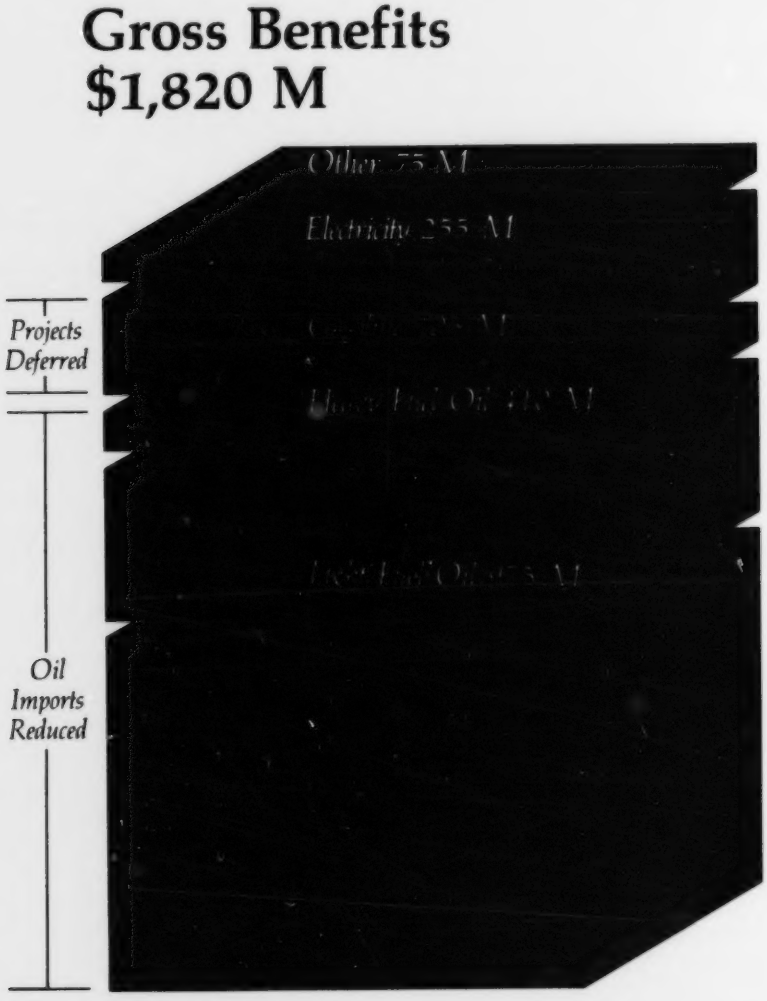
# *Cost-Benefit Results*

Cost-benefit analysis is a project appraisal technique widely used throughout the world and in British Columbia for major project evaluation.

In cost-benefit analysis, an attempt is made to identify and measure the major benefits and costs of a project from the point of view of society. In this particular case, a comparison is made of the 'true' value of the resources saved by providing natural gas on Vancouver Island (the 'benefits') and the 'true' value of the resources that are used up by doing so (the 'costs'). In large part, the benefits are represented by the values of the energy that will be displaced with the introduction of gas service; the costs are the value of the natural gas used and the costs of transporting it to the Island. To the extent that the value of the benefits exceeds the value of the costs, there is a net saving to society and the analysis should justify the project being supported by governments.

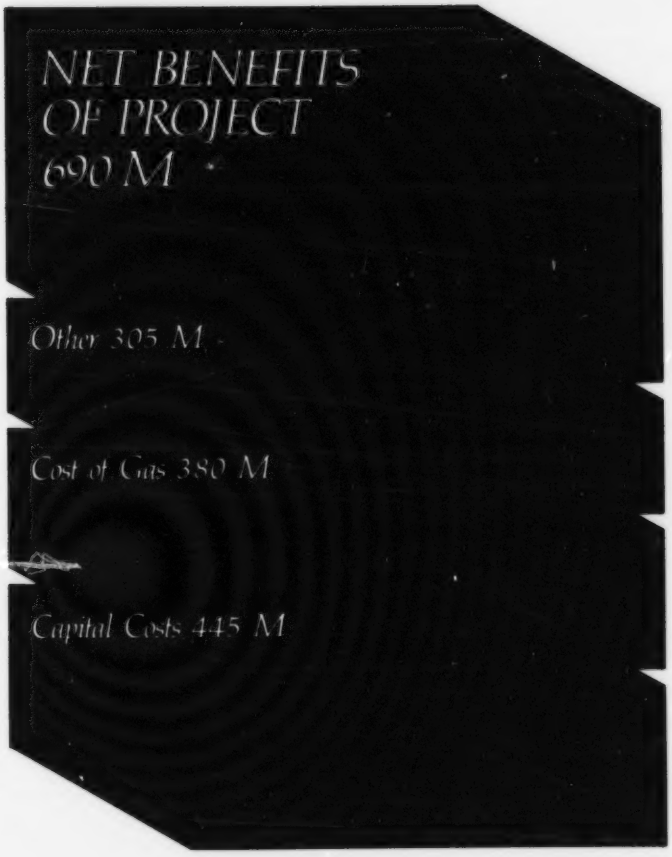
The estimates of the project's major benefits and costs are presented in the following figure for the southern route. In summary, project benefits exceed project costs by almost $700 million. The major project benefits relate to the displacement of refined petroleum products since, ultimately, Canada will not have to import as much crude oil at higher world prices once natural gas is available on Vancouver Island. The project also results in lower electricity costs because it helps to defer the need for generating and transmission facilities.

# Benefits and Costs of Project



Southern route, 1986–2015

In millions of 1982 dollars
discounted at 8% real




**Gross Costs $1,130 M**

# *Cost-Effectiveness Results*

The cost-benefit analysis establishes that from the point of view of society, it is more cost effective to bring natural gas to Vancouver Island than to meet the Island's future energy needs exclusively through increased supply of refined petroleum products and electricity.

The question remains as to whether provision of gas service is the most cost-effective means of meeting the Island's energy needs compared to all other possibilities. The cost effectiveness analysis therefore attempts to answer the question: Although provision of natural gas on the Island is a good idea, relative to the conventional alternatives, is it the best option of all? Possible alternatives that come to mind include increased wood waste utilization and conservation, as well as increased supplies of energy from sources such as wind and tidal power.

The analysis shows that provision of natural gas on Vancouver Island is the most cost-effective option. On the subject of wood waste utilization, the market analysis underlying the cost-benefit analysis assumed that natural gas will not displace hog fuel. Pulp and paper companies on the Island already consume large quantities of this energy resource and it is assumed utilization will (and will be encouraged to) increase. The major factor limiting wood waste utilization on the Island over the long run will be its availability.

On the subject of conservation, although there is a considerable amount of conservation built into the market forecast presented in Section 5, from the point of view of society it may be cost-effective for a larger portion of the Island's energy needs to be met through additional conservation initiatives. However, such initiatives are not judged to be an effective substitute for the provision of gas service. Rather, a combination of increased conservation and the provision of gas service on the Island would appear to be the most cost-effective means of meeting future energy needs.

# *Employment Generation Results*

This analysis measures the impact this project would have on employment in the province and the rest of Canada. This project will lead to jobs and incomes for those directly involved in the laying of a pipeline. But the impact does not stop there. There are ripple or 'multiplier' effects whereby the additional materials required by the companies constructing the pipeline will lead to new jobs and incomes for those supplying these materials, and so forth.

In summary, as a result of capital expenditures associated with the project, it is estimated that more than 20,000 man-years of employment will be created between 1983 and 1995 with almost half of the employment generation occurring in 1983, 1984, and 1985 and with 60 per cent of the jobs located in British Columbia and the remainder elsewhere in Canada.

# 8 *Project Funding*

In the section on financial results, a pattern of revenue deficiencies was evident in the early years of operation using market clearing prices. In the other case described, in which natural gas is at a price similar to that paid by eastern Canadian consumers, deficiencies are evident to the year 2000 and remain relatively constant.

Prior to the energy crisis of 1973 and 1974 there was a relatively free market in the Canadian natural gas industry. That is, natural gas was priced to be competitive with alternate hydrocarbon fuels purchased at the lowest possible cost in world markets. In the 1950's when most of the major Canadian natural gas pipelines were constructed across the country, there was a problem in financing these expensive systems since it takes time to connect customers and build up revenue. These early financing problems were overcome in a number of ways. In the case of the 1954 Trans-Canada gas pipeline project, Alberta to Quebec, the front-end funding problem was solved in two ways. Firstly, gas producers in Alberta accepted extremely low prices for their gas at the wellhead (6¢ per thousand cubic feet) and secondly the sponsor, Trans Canada Pipeline Co. Ltd., was forced to seek early financial support directly from the federal government. This subsidy or loan was repaid by the company when the system became profitable.

The business conditions under which major pipelines are built today have changed dramatically. It is now no longer possible to develop a major new pipeline project using historical or conventional methods of pricing and funding. Beginning with the concerted move by OPEC countries in 1973 and 1974, prices of oil have increased tenfold. Canada, together with most other oil-importing countries, intervened and adopted drastic measures to deal with the energy crisis, such as subsidy programs and pricing policies to encourage substitution from oil, and subsidy programs to extend natural gas transmission and distribution systems. Measures such as these directly affect the prospects for establishing a gas pipeline to Vancouver Island.

The following discussion suggests ways and means which might be considered for ensuring the viability of the pipeline project.

In view of the social, economic, and energy policy benefits resulting from this project, it is recommended that a policy be formulated for addressing the issue of funding revenue deficiencies and assuring that the project proceeds. Such a policy would logically embrace three principles:

- All relevant provisions and policies within the federal government's National Energy Program be extended for the purpose of building a pipeline to Vancouver Island.
- That the policy take into account precedents established by other projects initiated under the general provisions of the National Energy Program, particularly the precedent established by the Trans Quebec and Maritime pipeline project now under construction.
- That the policy take into account a sharing of the revenue deficiencies, commensurate with the benefits received from the development of the pipeline.

These three principles are discussed in detail in the following.

# *National Energy Program, 1980 and 1982 Update*

This program represents a major intervention into virtually every facet of the Canadian energy scene. One important thrust of the NEP is to quickly substitute natural gas for oil in markets throughout Canada. This was to be accomplished in most part by offering a range of comprehensive subsidy programs to those consumers who would convert from oil to other fuels. Further, the NEP introduced radical new oil and natural gas pricing policies. The objective of the NEP is to cause a reduction in the use of oil in Canada to no more than 10 per cent of the total energy consumed by 1990.

The NEP subsidy programs which would directly contribute to Island consumers and thus facilitate a gas pipeline to the Island include:

- The Canadian Oil Substitution Program (COSP) which offers up to $800 for households or businesses to switch from oil to gas;
- The Distribution System Expansion Program (DSEP) which provides direct grants to distribution companies to expand into new market areas which for economic reasons would not be served;
- The Industrial Conversion Assistance Program (ICAP), a federal government program to provide up to 50 per cent of the cost of converting industrial boilers and process heaters from heavy fuel oil to natural gas;
- Federal Building Conversions which implement a federal government commitment to cut fuel oil consumption by 40 per cent over 11 years.

In addition, other specific financial commitments discussed below were made as part of the National Energy Program.

# *Precedents*

The National Energy Program, 1980 stated: *"The Government of Canada will set aside up to $500 million, to be used if required, to support the eastern Canada system extension and the new lines to Vancouver Island."*

The National Energy Program Update 1982 promised: *"The Government of Canada will establish a "lateral fund" of $500 million to pay for construction of laterals in the Province of Quebec, up to their current estimated cost."*

This latter provision was implemented on October 27, 1982, when Energy Minister Jean Chretien announced *"the Government is implementing its commitment to provide up to $500 million to finance the construction of natural gas pipeline laterals in Quebec."* A press release elaborated, *"The first system, in the Eastern Townships, will result in payments of nearly $160 million and will serve a population of 235,000. The second system (Saguenay-Lac-Saint Jean region) will cost about $250 million and will serve a population of 220,000."*

On November 17, 1982, Mr. Chretien announced that the federal government had reached an agreement worth up to $100 million with two Quebec natural gas distributors to assist the companies in promoting the regional expansion of new gas markets in that province.

In addition to these $600 millions of direct grants which were provided to the Quebec and Maritime extension, the NEP Update provided another major concession, namely allowing the rolling-in of the cost of service of the main transmission line from Montreal to Halifax into the Canadian cost of service. The Canadian cost of service is paid for by natural gas consumers east of Alberta and directly by the federal government, to the extent that the wholesale price in eastern Canada is maintained at 65 per cent of the price of crude oil. This is confirmed in the following excerpt from the NEP—Update 1982: *"A policy of uniform wholesale gas prices from Toronto through to Halifax has been implemented. The policy provides for the wholesale price of gas to be set at about two-thirds of the price of crude oil to eastern Canadian consumers. This attractive gas price provides consumers with a major incentive to convert off oil, and helps to establish the demand necessary for the expansion of the gas infrastructure."*

The concept of rolling-in the cost of service of new facilities to all users on the system is not uncommon in meeting revenue deficiences for the early years of new pipeline extensions or for spreading the cost of major electrical utility system expansions. For example, in British Columbia, the cost—about $1 billion—of the 500 kva electrical transmission line currently being constructed from the Lower Mainland to Vancouver Island will be absorbed by all electrical users in the B.C. Hydro service area. This study analyzed the impact of rolling-in the cost of service of the pipeline over all natural gas users in the province and found that a 10¢ per thousand cubic feet increase in rates to all consumers would reduce the revenue deficiencies of the project by about one-third. An increase of 10¢ per thousand cubic feet is about the maximum additional tariff which would be paid by eastern Canadian consumers as a result of rolling-in the cost of service of the main transmission line from Montreal into the Canadian cost of service.

All of the above precedents could be considered for eliminating the revenue deficiencies of the proposed pipeline system. However, federal precedents for the Trans Quebec and Maritimes pipeline (including federal grants to major elements of the system) and the prior federal commitments to funding of the Vancouver Island gas pipeline are clearly the principal factors to be considered to mitigate the revenue deficiencies for the pipeline to Vancouver Island.

# *Sharing of Revenue*

The project generates revenue for several levels of governments in a number of ways.

The federal government is clearly the principal beneficiary of the project. First, the natural gas sold on the Island will replace petroleum products and thus will reduce by a substantial amount the subsidy paid on oil imported into Canada. Second, the federal government will receive income tax on earnings of the pipeline company or companies, as well as income tax on the earnings of British Columbia gas producers as a result of this new market. Third, the federal government levies a significant tax on all British Columbia gas produced through the Petroleum and Gas Revenue Tax.

The provincial government receives its share of revenues from the project in the form of corporate income tax from pipeline and producing companies. The largest component, however, is the economic rent (or royalties) received as a result of additional British Columbia gas produced to satisfy new markets.

The principal flow of revenue to municipalities is in the form of property tax levied against the value of pipeline assets located within the municipal boundaries.

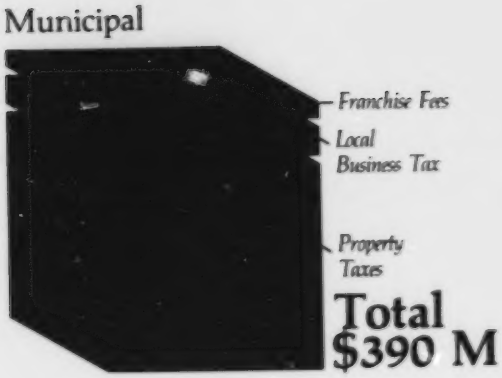
It should be noted that the financial arrangements offered by the federal government to the Trans Quebec and Maritimes project are not conditional on capital contributions coming from provinces receiving the new gas service.

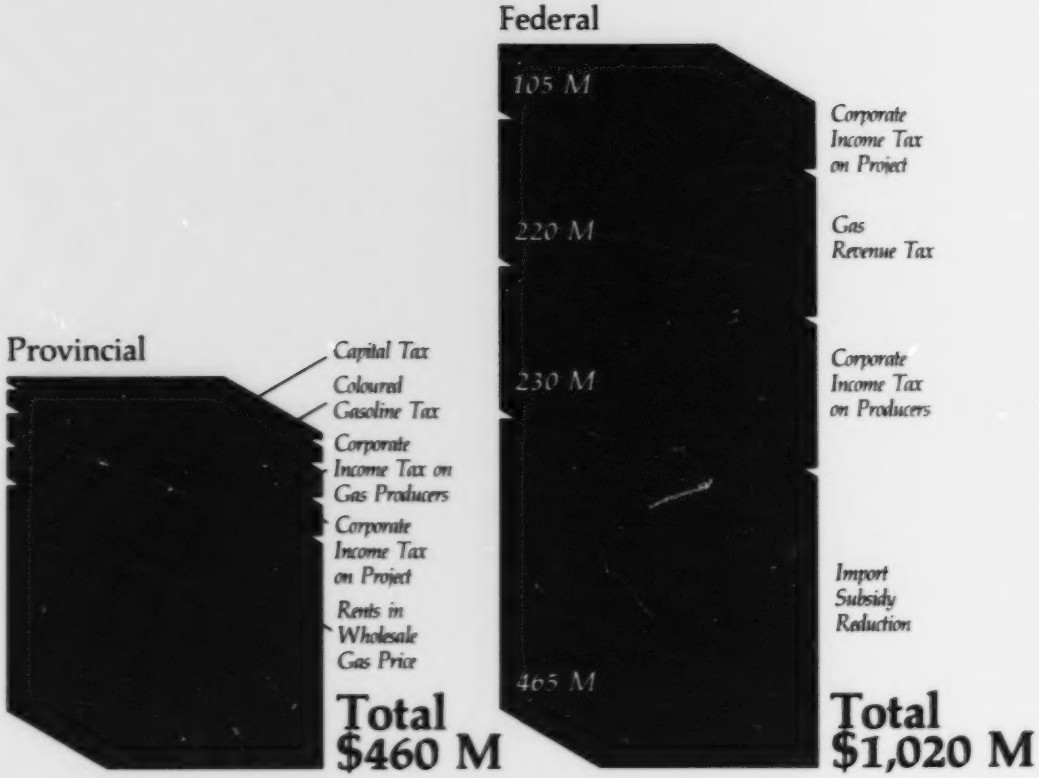
The following figure demonstrates the basic revenue flows to the three levels of government.

# Financial Flows to Governments

(millions of current dollars; southern route) 1986-2000

## Total All Governments $1,870 million




Federal
105 M
Corporate Income Tax on Project
220 M
Gas Revenue Tax
230 M
Corporate Income Tax on Producers
Import Subsidy Reduction
465 M
Total $1,020 M
Provincial
Capital Tax
Coloured Gasoline Tax
Corporate Income Tax on Gas Producers
Corporate Income Tax on Project
Rents in Wholesale Gas Price
Total $460 M

# 9 *Fertilizer Project*

In December, 1981 four companies under the leadership of Westcoast filed a proposal with the British Columbia government to build a nitrogen fertilizer complex at a location on the coast. The proposal indicated that Powell River or Port Mellon were the preferred sites if gas were available. This proposal was submitted as part of the province's Natural Gas Allocation Process. The purpose of the filing was to seek an allocation of surplus natural gas for the project.

On October 19, 1982 the Minister of Energy, Mines and Petroleum Resources announced a decision to reserve 400 billion cubic feet of gas for the production of ammonia/urea, if and when a project could be economically advanced and a location and proponent selected. Since Powell River is one of the consortium's preferred sites and since such a location is significant in terms of pipeline route selection, the subject is relevant to this assessment.

The manufacture of ammonia and urea in modern, world scale plants is now taking place in a number of locations in Alberta and the U.S. Midwest, using natural gas as feedstock. In spite of recent sharp fluctuations in world fertilizer markets and prices, this manufacturing activity is quite capable of making significant contributions to the area in which the plant is located, as well as to the province and Canada.

Based on discussions with the consortium, the following describes the proposed project:

- Preferred Location: Powell River, B.C.
- Ownership: British Columbia Resources Investment Corporation
  Chieftain Development Co. Ltd.
  Union Oil Company of California (Union Chemicals Division)
  Westcoast Transmission Company Limited
- Construction Schedule: 3 years, with start-up mid 1986
- Capital Cost: $675 million (current dollars)
- Rated Capacity: 1,600 tonnes per day of anhydrous ammonia
  1,600 tonnes per day of granulated urea
- Feedstock Requirement: 23 PJ (21 BCF) per year of natural gas
- Primary Market: Pacific Basin, including the U.S. west coast
- Direct Employment: Construction—1,650 man years
  Operation—240 permanent jobs with annual payroll of $10 million
- Direct Benefits: over a 3 year construction and 20 year operating period, the total direct benefits of the project to the British Columbia economy are estimated at over $4 billion (1981 constant dollars).

A nitrogen fertilizer complex as described above would add a major dimension to the province's industrial structure with the development of a major gas-using petrochemical operation.

This assessment of a pipeline to the Island indicates that the northern route is considerably more expensive than the southern route. However, the northern route with a fertilizer complex located at Powell River would likely be more attractive from the broad provincial perspective when the potential benefits of a fertilizer complex are added to the benefits which flow from a pipeline, assuming that a satisfactory arrangement on feedstock pricing can be achieved. Therefore, if the government wants to decide quickly on the Island pipeline and on route selection, it is important that the consortium bring forward a more detailed proposal as soon as possible.

In this connection, the consortium has indicated that more engineering studies are needed. Also, the matter of feedstock price will require further serious evaluation and negotiation, in order to ascertain whether a pricing agreement can be achieved which not only allows the fertilizer project to be adequately profitable but which also provides a fair return to British Columbia natural gas producers and to the province as owner of the resource.

# 10 Policies and Procedures

The terms of reference for this review included providing views on appropriate policies and procedures respecting a public hearing to consider formal applications by the companies for an Energy Project Certificate.

## Policies

The foregoing sections have shown the extent to which the project is critically influenced by governments' policies. In the review, a number of areas were identified where clarification of policy and its specific application to the delivery of gas to Vancouver Island would be constructive in realizing the objectives of such a project. We refer here to the governments' policies of achieving energy self-sufficiency through the displacement of oil as quickly as possible. Clarification along the following lines would also assist applicants, intervenors, and the British Columbia Utilities Commission and thereby expedite the hearing process.

### Gas Marketing

In order to provide guidance over the long run to all those involved in meeting Vancouver Island's energy requirements, it is recommended that the British Columbia government set a 'target' market share for natural gas on the Island (a per cent of total non-transportation energy use in the market). This could be accompanied by an explicit recognition that natural gas is expected to displace existing and future use of oil, displace some future space and water heating demand for electricity and, at the same time, preserve the maximum economic use of wood waste on the Island. Further, the statement should preferably indicate the government's willingness, if necessary, to implement further specific policies and programs in order to achieve these aims.

## *Revenue Deficiencies*

In order that companies can respond to a Call for Applications, it is highly desirable that both federal and provincial governments agree in principle, at the outset, that revenue deficiencies will be made up in order to ensure the project's viability. Moreover, it would similarly be desirable if some progress in the federal/provincial negotiations on this matter could be reported. Finally, if construction is to follow the certification of a successful applicant without delay, a detailed agreement should be in place at the time of certification.

# *Procedures*

When applications are received, it would be desirable to conduct a public hearing and select and certificate a company or companies to undertake components of the project. It is understood that the government desires that hearings be comprehensive and publicly test each of the proposals, yet at the same time, be expeditious, be limited to essential matters, and be conducted with the understanding that a successful applicant(s) will have subsequent detailed approvals to obtain. Therefore it is suggested that:

a) The comprehensive technical economic and market analysis done to support this project review be made available to the prospective applicants and subsequently be submitted to the hearing as a public report;

b) If the policy statements and the federal/provincial agreements can be made, as outlined above, then it is recommended that applicants not be obliged to prepare, nor the BCUC to recommend on, matters covered in Section 7 of this report (Economic Impacts);

c) That the Minister of Energy, Mines and Petroleum Resources and the Minister of Environment, in setting the terms of reference, consider excluding other subject areas covered in the technical report. Areas where this might apply are market forecasts and detailed financial analysis;

d) It is considered essential, in order that the hearings may distinguish applicants on their merits, that individual companies' engineering, cost estimates, construction methods, and operating plans, together with environmental and socio-economic impacts, be adequately reviewed.